Marbled Murrelet Population Monitoring Team
Conference Call Notes from June 10, 1999

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OVERVIEW
We have not yet developed a comprehensive sampling design for monitoring marbled murrelet populations under the Northwest Forest Plan. Therefore, this field season we have further opportunity to work on different aspects of the sampling design and survey method. The group discussed different tests they will conduct during the 1999 field season.

SURVEY METHODS
<u>One versus two observers:</u>

1. SM and CR asked for comments on their design:

a. MR suggested they simplify their design. Delete the Driver Only and the Radio option since they don't seem like real options anyway. SM feels the Driver Only is an attempt to isolate the driver's contribution and the Radio is similar to CT's current setup so it is a real option.

b. JB noted that the biological importance is not defined. What level of difference is acceptable or unacceptable? What level of difference is enough to make us decide one way versus another to use one observer or two? This should be determined *a priori*. MR notes these comments also apply to his proposed study.

c. CT suggested looking at density also as a response variable.

d. SM suggested that any of these tests (including radial vs perpendicular) include more than one crew. Need to get replicates.

2. MR also asked for comments on his proposed design which is essentially a mark/recapture design with independent observers and primary observers. IO's "mark" certain birds and PO's "recapture."

a. CT suggests getting behavior, age class, and group size. Behavior turned out to be very important for their boat avoidance work. Looking at their data with Jeff Laake. DE says they do collect behavior information about foraging, diving, and boat avoidance but not necessarily flapping.

<u>Perpendicular versus Radial Distances:</u>

We determined that surveyors have to be within 25% of actual perpendicular distance. How much of the time do they have to be within 25%? 100% of the time. 25% refers to the perpendicular estimate. Measurement error has to be a small component of sampling error. We might be able to get at it analytically if we had a feel for the sampling error and then see what is acceptable.

Could use a digital compass to check the "true" angle (even though a compass could be off by 1 or 2 degrees). Or is the boat off the transect line error even larger. DE thinks the latter is small. SB found small difference in the density estimates without errors (47 birds/square km) compared to with errors (46 birds/square km). Problem is still don't know true distance.

Neither MR or CR will test radial versus perpendicular this year. We will need to pick one or the other. JB - we should standardize unless there is a compelling reason why we shouldn't. If they both measure the same parameter (they do), and the costs are the same, pick one. MR feels the only cost difference is in missing birds. Usually would miss them further off the transect which doesn't change density estimates. But you might miss some adult/juvenile information.

If direct perpendicular estimates are taken, how do we train people? How do we test people? How do we do QA/QC while we are underway? We would need a field of buoys to train people. MR and CR can use crab pots in the vicinity of their transects and boat docks.

CT will do some perpendicular versus radial distance tests. He will send a proposal around quickly. It will be similar to the tests MR did with some minor modifications. Each individual will measure the same object using both measurements, alternating which measurement method is used first. It will be a paired t-test as opposed to a two-sample t-test.

SAMPLING DESIGN

MR looking at offshore distributions around San Juan Islands. SB suggest perpendicular or zigzag to avoid the difficulty they had with the offshore distributions in CA/OR (they had to extrapolate mathematically from along shore transects).

CT adult/juvenile distribution. They get a GPS for each bird. Has seen differences in past years. Has GIS overlay of kelp, shore line, bathymetry. Can he look at them separately? Not if they are correlated. Do multiple regression, fit a model, look at residuals and see what they tell you (not logistic because it isn't binary). Plot residuals against each variable and search for patterns. What about a 3-dimension plot? You can use the moving kind using size and color of points to help your brain discern patterns.